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MACDONALD INSTITUTE.

ONTARIO AGRICULTURAL COLLEGE.

Gardening for Schools.

By S. B. McCready, B.A., Professor of Nature Study.

INTRODUCTORY.

This is the fourth College Bulletin on Nature Study that has been issued for teachers of the Province. The first three are:—

No. 124. Dec., 1902. Nature Study, or Stories in Agriculture, by College Staff.

No. 134. June, 1904. Hints in Making Nature Collections in Public and High Schools, by Dr. W. H. Muldrew.

No. 142. May, 1905. Outlines of Nature Studies, by Prof. Lochhead.

For the preparation of this Bulletin, the experience and help of Mr. J. Buchanan, of the Agricultural Department; Mr. E. J. Zavitz, of the Forestry Department, and Professor Hutt, of the Horticultural Department, have been freely placed at my service, and are gratefully acknowledged.

Its chief object is to bring the Ontario Agricultural College and the schools of Ontario closer together for their mutual benefit; to make available to our teachers and scholars lines of work and instruction which have been in use and development in and through the College for years, and which present educational conditions are demanding for our common schools; to indirectly deepen the influence of the College down to the boys and girls who may never have the opportunity for direct instruction, recognizing the principle that a college receives its best impetus forward only in directing its service downwards. The needs of the rural schools especially, have been kept in view. The graded urban schools do not have the same demands put upon them for instruction in agricultural subjects, nor does nature study at large touch the lives of city dwellers so practically as it does those of our farming population.

In this connection, the observations and conclusions of members of the Mosely Educational Commission are suggestive. This Commission was made up of twenty-six prominent selected educationists of Great Britain, under the guidance and patronage of Mr. Alfred Mosely. From October to December, 1903, they made a close inquiry into the American school systems. Their findings, published in a Report issued in 1904, afford a valuable contribution to the literature of education, although, naturally, their aim was the betterment of British schools.

One of the things that surprised them was the interest taken by the Governments in the advancement of agricultural education. They were greatly impressed by the means taken to bring science and scientific methods to the door of every farmer in the land through freely distributed bulletins and reports. Special notice is given the work of the Experiment Stations, Farmers' Institutes, Women's Institutes, Seed Distribution, and Co-operative Experimenting. They urge an adoption of similar methods for Britain, in order the better to meet competition.

Hitherto, in our Province, this Governmental interest in education has been directed towards the men and women, and over the heads of the boys and girls. We wish here to help to give it a more natural direction. For the rural schools, it is hoped that an acquaintance with the Experimental Union may be good. At the present time it is too much to expect the one-master country school to undertake technical education in agriculture in a school garden. Nearly all conditions are unfavorable. But by joining in the work of the Union much may be accomplished.

For the urban schools, it is hoped that the information on home gardening may be helpful. It is not meant for those schools that have worked out already their own schemes for gardening, but for those that need a statement of the experiences of others before commencing.

PLACE OF GARDENING IN EDUCATION.

The intention had originally been to offer some plans, suggestions and instruction. Investigation, however, on the subject of school-gardening throughout the Province forced us to the conclusion that neither the country nor the teaching profession was ready for undertaking it. Although Departmental approval and material encouragement were offered in November, 1903, no schools seem to have taken up the work. It is true there are six regularly organized gardens—five in Carleton county, and one in Guelph, in connection with the Consolidated School—but these are all under the special care and patronage of the Macdonald Fund. It is also true that gardening is carried on in school flower plots in many places, but it is not often the school gardening as understood ordinarily in educational terminology.

School Gardening is a school subject of European origin. In the schools of France, Germany, Sweden, Austria, Belgium and Switzerland it has been taught for years. The reason for its being is very largely an economic one. It is to increase the productiveness of the land and enhance the wealth of the State. Nor has it failed. In France, for example, their system of agricultural education, of which the school garden is a chief part, is credited with having doubled the resources of that country in recent years. No doubt it has its cultural value, but the economic side is the one emphasized. It is this form of school gardening that finds encouragement now in other parts of the world, such as the West Indies, New Zealand, and some of the Australian States. It is not meant that this feature of it is ignored here. For our rural schools, it

is encouraged officially, but up to the present it has been little practised. Our teachers are not prepared for it, and our people have not felt the need of it. It is to give our teachers a natural opportunity for training themselves in this educational work, and our people for testing its value, that we introduce the Ontario Agricultural and Experimental Union to their notice.

But the school gardening that it is sought to incorporate into American and Canadian schools at large is something different. At any rate, it is generally so described. Its most important side is not economic. It cares less about the welfare of the State and more about developing the powers of the individual child. The garden and the products are secondary; the results to the child's character are of prime importance. So we may have poor school gardens but good school gardening. The child may not learn to prune, graft, cross-fertilize, spray, or prepare soil scientifically, but he should come out from the work observant, careful, considerate, and equipped with general tendencies good for him in his life's work or in his life's leisure. It is not to make him an agriculturist, an horticulturist or a forester. It is a general culture, and not a technical training. It makes for love of home and love of nature. In the crowded city, it satisfies a hunger for the quiet rest of the country; in the lonely country it furnishes a satisfying and wholesome companionship.

To all who practice in this garden work there comes the uplift that arises from directing and controlling Nature's processes in the production of a wholesome vegetable or a beautiful flower. It is disciplinary and cultural education, not technical.

The gospel of this kind of school gardening finds expression in Professor L. H. Bailey's "The Nature Study Idea":

"I dropped a seed into the earth. It grew, and the plant was mine.

"It was a wonderful thing, this plant of mine. I did not know its name, and the plant did not bloom. All I know is that I planted something apparently as lifeless as a grain of sand, and there came forth a green and living thing unlike the seed, unlike the soil in which it grew. No one could tell me why it grew, nor how. It had secrets all its own, secrets that baffle the wisest men; yet this plant was my friend. It faded when I withheld the light, it wilted when I neglected to give it water, it flourished when I supplied its simple needs. One week I went away on a vacation, and when I returned the plant was dead; and I missed it.

"Although my little plant had died so soon, it had taught me a lesson; and the lesson is that it is worth while to have a plant."

Of course, there are projects for the more technical agricultural education in our rural public schools and the *Agricultural High Schools* and *Consolidated Rural Schools* yet to be. And in localities in some old settled parts, where specialization has developed, the European phase may soon become evident. But for some years to come, the general motives for this study in this country will be that outlined by Professor Bailey. It is the natural motive in our kind of democracy, and in a land of our material resources. The safety of the State has little concern with us; the promotion of the individual's welfare is untrammelled. Nor

have we yet learned what necessity is put on the land by a crowded population; vacant areas are large and settled areas yield well with more or less careless or unscientific treatment.

Our people and our teachers are not ready for the formal, organized garden. It is not possible to suddenly graft part of an educational system of one country on to the system of a country very different. Educational systems are expressions of national tendencies working through many years. They are shaped by many forces, political, racial, industrial and religious. These tendencies and forces leading to the introduction of such things as manual training, gardening, etc., into our primary and secondary schools are not acknowledged at the present time by many in our Province. Or at any rate, the acknowledgment has not reached the point of adoption and establishment. The truth is, there has been very recently great changes in educational aims, methods and equipment, to which we have not adjusted ourselves. We will probably be the better for making any new adjustment that has to be made, slowly. Over zeal may work ultimately to less and slower progress than guarded procedure.

The ordinary rural school as at present constituted can not very well nor wisely undertake a school garden. The subject deserves better than hasty, inconsiderate adoption. There are many difficulties to face; there are indifferent parents, antagonistic trustees, unprepared and changing teachers, crowded programmes of study, and the unsolved summer vacation problem. It will be well to go slow; we can do naught else in comfort and safety. The time may come when the country school becomes a centre for the spread of the arts and sciences in its district. It will have a teacher's home in connection with it, and the tenure of the teacher's office will be for his life. Or it may be that the consolidation of schools will raise the school to its proper place. In either case, the school garden will be part of the equipment. We are not dealing with a possibility, however, but with a condition.

Much, however, can be done in home experimental plots and home gardens, and they will naturally lead in due course to school plots and school gardens; and the time will be when teachers and people are ready for them. There is a right time for everything. The work of the Experimental Union will aid in the first kind of gardening, and such work as done by the St. Thomas and Cleveland schools may aid in shaping the second.

THE ONTARIO AGRICULTURAL AND EXPERIMENTAL UNION.

Our purpose is to introduce the work on agriculture, forestry, and horticulture only. The experimenting in chemistry and poultry is of a restricted character, and is not adapted to public schools. It is offered as a practical side of the nature study work. It may be said that making it practical deprives it of the right to be called nature study. We shall not quarrel about its name. It is good for boys and girls; it is good for the grown-ups, too, and the function of the school is to concern itself

with what is good for boys and girls and the community behind them, not only for the few years they may be in school, but for all the years that they are to live. Some may prefer to call it elementary agriculture; that is a proper thing for nature study to be for country people.

The experimenters are of different classes. Some of them are quite young. One lad in Hastings County who had an experiment last year was only eleven yearse old. In many cases a father and his boys work together; in other cases they take different experiments. Sometimes it is the mother or the daughters of the house who undertake the work. Teachers should use wise discrimination in advising the undertaking; better not have it undertaken at all than that it should fall into the hands of thoughtless, careless, irresponsible persons. Wherever possible, too, it should be brought into a close connection with the school; placed near the road so that daily observation of it may be had. If a school can get a piece of land in a neighbor's field and undertake an experiment for itself, so much the better for the children.

Applications for the announcements on the next year's experiments should be made about Christmas time to the Director of that branch of the work in which one is specially interested. Except that, in the case of forestry, requests for seedling trees will have to be made about mid-summer previous to the spring planting.

It will be noticed that these outdoor co-operative experiments in agriculture are of a nature with those practised in the science laboratories of school. They differ much in the length of time for working out. They differ more in the vital interests concerned. The mental culture is proportionally stronger because of the greater care, observation, and interest involved. In our school books we wrote of our work in chemistry or physics under the headings of *Experiment, Observation, Conclusion.* We did something, that we might see something, that would teach us a lesson. The doing was good for us when we did our best; the seeing good for us when we saw truly, and the thinking was for the making of us better then and thereafter. So is it with such work in the farm laboratory. It is disciplinary. It makes all other doing, seeing, and thinking better.

CO-OPERATIVE EXPERIMENTS IN AGRICULTURE.

In order to acquaint our teachers with the aims, scope and development of this educational movement, we give Professor Zavitz' report for 1905:—

"As director of the co-operative experiments in Agriculture, I beg to submit the report of the work conducted throughout Ontario in 1905. I am pleased to state that we have received a larger number of good reports during the past year than on any previous occasion. This is what we would naturally expect. The co-operative work of the Experimental Union has long passed its experimental stage. We have a large number of ex-students and others who have conducted experimental work successfully for eight, ten, and twelve years, and are becoming so trained

in the work that they are doing service which is not only of advantage to themselves but to the country as a whole. It is impossible to estimate the value and the influence of this work in connection with the agriculture of our Province. The experimenters deserve great credit for their work in successfully conducting the various experiments, and the farmers as a whole owe much to these men who are recording the results of their carefully conducted investigations from year to year. The summary results of these co-operative experiments, which are to be presented and discussed at the different sessions of this annual meeting of the Experimental Union, are submitted with a good deal of confidence as to their value in furnishing information which should prove very serviceable as a general guide in connection with the practical agriculture of Ontario.

"As there are probably some in attendance at the meeting and many others who will read the annual report who are not familiar with our system of co-operation along the various lines of agricultural experimental work, we give a brief outline of the Experimental Union in connection with the Agricultural College and of the co-operative experimental work in connection with the Union. The experimental work at the Agricultural College was commenced in 1876, just two years after the establishment of the College itself. These experiments have been increased from year to year, and now include work along the various lines of agriculture. In the experiments with farm crops, upwards of 2,000 plots (see p. 7) are used annually in growing grains, fodders, grasses, clovers, roots, and potatoes, with the object of obtaining information regarding the best varieties, the most productive selections of seed, the best dates of seeding, the most improved methods of cultivation, the most economical ways of increasing the fertility of the soil, etc.

"Five years after the College was started, the officers, students, and ex-students formed themselves into an association, under the name of the 'Ontario Agricultural and Experimental Union.' The objects of the association, as formulated at that time, were as follows: 'To form a bond of union among the officers and students, past and present, of the Ontario Agricultural College and Experimental Farm; to promote their intercourse with the view to mutual information; to discuss subjects bearing on the wide field of agriculture, with its allied sciences and arts; to hear papers and addresses delivered by competent parties; and to meet at least once annually at the Ontario Agricultural College.' In 1886 the members of this association appointed a committee to confer with the officers of the College, with the object of establishing a system of co-operative experiments throughout the Province. Letters were written to members of the Union, and twelve consented to conduct experiments with fertilizers and field crops on their own farms in the year 1886. From that time to the present, the work has gradually branched off along different lines until it has touched on several phases of agricultural work.

"In the spring of each year, circulars, outlining the co-operative work, are distributed by the agricultural committee appointed by the Experimental Union. Those asked to take part in the scheme of co-oper-

A partial view of the Experimental Grounds at O. A. C. Practical Farm... iving Practical Information along the lines of Practical Agriculture. Fifty acres are ... ble work.

ation may be classified as follows: (1) The officers and students, past and present, of the Ontario Agricultural College, who pay an annual fee of 50 cents, and have control of the executive work of the Experimental Union; (2) the experimenters of former years who have done satisfactory work; (3) leading farmers, gardeners, and others, whose names have been suggested by secretaries of Farmers' Institutes, secretaries of Agricultural Societies, principals of Collegiate Institutes, inspectors of Public Schools, and others; and (4) various persons who have seen the experiments of other people, or have in some way heard of the work and wish to assist in the movement by conducting experiments on their own farms. The circulars are distributed in the order here given, starting first by sending to those who have been connected with the College and are therefore trained for the work, and finishing the distribution by sending to those engaged in some branch of practical agriculture who have not conducted experiments previously but who wish to undertake the work.

"From the beginning, the co-operative experimental work of the Union has been directed and controlled by circulars and letters, printed and written, which have been transmitted through the mails. When personal visits have been made to the experimenters, the object has been to enable the director to study the difficulties of those actually engaged in the work, and thus to be in a better position to know the best methods to adopt in the printed instructions, rather than to take any part in the immediate control of the practical operations of the experiments.

"Every man is made responsible for his own experiment, and is urged to do the very best he can for himself, for his neighbors, and for the Union. Many persons who at first took but little interest in the experiments, have afterwards proven themselves to be most valuable experimenters, and have shown great care and accuracy in the details of their work. The names of those who conduct the experiments with the proper amount of care and accuracy are placed on the list of successful experimenters, and these individuals are carefully looked after in the future. It will, therefore, be seen that the Experimental Union makes a study of the men themselves as well as of the products of their labor. The education of the men in the development of accurate methods, careful observation, and a deeper interest in the occupation of farming is one of the objects of the co-operative experimental work in Ontario. I have no hesitation in saying that the results which have been obtained along this line alone are of far greater value than the entire cost of the co-operative work of the past seventeen years.

"No direct financial help is offered any person to undertake and carry through the co-operative work. It is purely a volunteer movement from the start to the finish. The materials for the experiments, the instructions for making the tests, and the blank forms for reporting the results are furnished free of cost to those who ask to join in the work and who sign the agreement furnished by the Union. Experimenters in crop production use the soil on their own farms, conduct the experiments themselves, and report the results to the director of that particular branch of co-operative work in which they have enlisted. In those experiments

in which crops are produced, the produce is retained by the experimenters as their personal property, except any small quantities which are returned to the College as samples.

"The cost of the co-operative experiments is paid conjointly by the station and the Union. The station pays for most of the labor and for some of the material, and the Union for all of the stationery, printing, postage, expressage, etc., as well as for part of the material required to carry on the co-operative work.

"In 1905, the work has been carried out along thirty-five distinct branches of field agriculture, thus covering practically all of the crops which are grown on the ten million or more acres of the cultivated land of Ontario. As in 1904, a large number of experiments have been conducted in New Ontario. There is scarcely a settlement of farmers in the northern part of the Province that has not received seed, and has from one to twenty or thirty of its number actually engaged in the experimental work. For instance, there were exactly forty-eight experimenters in the Temiskaming District in 1905. When I visited that district this summer, I realized more than ever the great importance of work of this kind in a new section of country. Some of the settlers had been careless in the seed which they had sown, and some of the most troublesome weeds were getting a foothold in the clearings. The farmers of the district were very enthusiastic regarding the experimental work, and we could already see the good influence of the Union work of the past two or three years in those settlements which were visited. It is impossible to estimate the great value of this work in supplying seed of the best varieties of farm crops, in encouraging improved methods of agriculture, and in starting the people in the new country to experiment and investigate for themselves along the lines of their life work."

Each year about thirty-five selected experiments are chosen for the work throughout the Province; five of them are for autumn work. Those for the spring of 1906 are listed to show the large agricultural interest served. They are all carefully chosen. They have been under test on the College experimental grounds for at least five years, and only those varieties that have proven themselves worthy are distributed. All these are open to any responsible resident of Ontario who agrees (1) to follow instructions, (2) to be careful and accurate in his work, and (3) to report results after harvest. Application for forms and information should be addressed about Christmas time to the *Director of Co-Operative Experiments in Agriculture, O.A.C., Guelph, Canada.*

List of Experiments in Agriculture for 1906.

Grain Crops.

	Plots.
1—Testing three varieties of Oats	3
2— *a* Testing three varieties of six-rowed Barley	3
b Testing two varieties of two-rowed Barley	2
3—Testing two varieties of Hullless Barley	2
4—Testing two varieties of Spring Wheat	2

	Plots.
5—Testing two varieties of Buckwheat	2
6—Testing two varieties of Field Peas	2
7—Testing Emmer and Spelt	2
8—Testing two varieties of Soy, Soja, or Japanese Beans	2
9—Testing three varieties of Husking Corn	3

Root Crops.

10—Testing three varieties of Mangels	3
11—Testing two varieties of Sugar Beets for feeding purposes	2
12—Testing three varieties of Swedish Turnips	3
13—Testing Kohl Rabi and two varieties of Fall Turnips	3
14—Testing Parsnips and two varieties of Carrots	3

Forage, Fodder, Silage, and Hay Crops.

15—Testing three varieties of Fodder or Silage Corn	3
16—Testing three varieties of Millet	3
17—Testing three varieties of Sorghum	3
18—Testing Grass Peas and two varieties of Vetches	3
19—Testing two varieties of Rape	2
20—Testing three varieties of Clover	3
21—Testing Sainfoin, Lucerne and Burnet	3
22—Testing seven varieties of Grasses	7

Culinary Crops.

23—Testing three varieties of Field Beans	3
24—Testing three varieties of Sweet Corn	3

Fertilizer Experiments.

25—Testing fertilizers with Corn	6
26—Testing fertilizers with Swedish Turnips	6

Miscellaneous Experiments.

27—Sowing Mangels on the level and in drills	2
28—Testing two varieties of (*a*) early, (*b*) medium, or (*c*) late Potatoes	2
29—Testing three grain mixtures for grain production	3
30—Testing three mixtures of Grasses and Clover for hay	3

The size of each plot in each of the first twenty-seven experiments, and in Nos. 29 and 30, is to be two rods long by one rod wide; in No.. 28, one rod square.

The advantages of the work, after twenty years' operation, are thus summed up:—

1. It systematizes seed distribution along definite lines and for valuable purposes.

2. It supplies a direct, as well as an indirect, source of information.

3. It enables practical men to obtain information regarding varieties of field crops, selections of seed, dates of seeding, methods of cultivation, ways of increasing soil fertility, etc., for their own particular farms, which they could not get in any other way.

4. It enables farmers to get a supply of pure seed of the leading varieties of grains and potatoes, which rapidly increases in quantity, and thus furnishes seed for sowing and planting on large areas and for selling at good prices.

5. It educates along the lines of careful handling and close observation, accurate calculation and economical methods.

6. It trains men to unite science with practice and to lead other men to do likewise.

7. It helps farmers to understand better the scientific principles that they read about in bulletins, reports and newspaper articles, and that they hear about at agricultural meetings.

8. It furnishes hundreds and even thousands of object lessons annually, which form centres for interesting study along the lines of progressive agriculture.

9. It supplies valuable topics and results for discussions in the field, at the fireside, in the corner grocery, and at meetings of Farmers' Institutes.

10. It stimulates the local papers to take a deeper interest in advocating better methods of farming.

11. It furnishes some exceedingly important results for printing and distributing in the form of bulletins and reports.

12. It adds dignity to farming and pleasure to farm life.

13. It exerts a wholesome influence in keeping the farm boys interested in farm work.

14. It leads to a substantial increase in farm profits, and to a steady advance in agricultural education throughout Ontario.

Instructions for each experiment are carefully prepared. Those for Experiment No. 25 (1906) are inserted here partly as a suggestion of a line of investigation that might be followed in any neighborhood with the school as a centre and with any variety of crop. Smaller plots may be used, but it is always advisable to have them a regular fraction of an acre. A plot of one-two hundredth of an acre is recommended for school gardens of limited area (10 ft. by 21 4-5 ft.). For a school test a less extensive experiment would be best; such an one as growing two plots of potatoes, one on well manured soil and the other on unmanured soil.

Experiment No. 25.—Four Fertilizers and No Fertilizer with Corn.

Instructions.

General.—Make plots exactly the right size; observe great accuracy in the work throughout; keep the plots clean and tidy; examine the experiment frequently; compare one crop with another; invite your neighbors to see the test; and discuss the results with your friends, in your local newspaper, and at the meetings of your Farmers' Institute, and you will surely enjoy the work, glean information for yourself, and have the great satisfaction of knowing you have tried to do good to others.

SPECIAL.—1. Be sure and do not leave out any fertilizer belonging to the experiment.

2. For an extra plot of similar size to the rest, secure five hundred pounds of average cow manure.

3. Wooden stakes painted white, on which the names of the fertilizers are plainly written with a lead pencil, answer nicely for labels.

4. Wooden stakes two inches square and two feet long, with the lower ends sharpened, are very suitable for driving in the ground at the four corners of each plot.

5. For your experiment, be sure and select soil which is very uniform throughout, and which is about the average quality of your farm.

6. Locate the experiment some distance away from buildings and trees, in order to prevent any injury by poultry or birds, or by the shade or the roots of trees, etc. Try and have your experiment near the public road, where it can be seen by the people who pass by.

7. Cultivate and harrow the land thoroughly, and thus make a seed-bed which is fine and uniform throughout. Work enough land to allow for a path three feet wide between each two plots.

8. Carefully measure six uniform plots; each plot being exactly two rods (33 feet) long by exactly one rod (16½ feet) wide, *i. e.*, one-eightieth of an acre.

9. Drive the wooden stakes at the four corners of each plot, and leave a clean path three feet wide between each two plots.

10. Spread the 500 pounds of cow manure on one plot, and mix with the soil to a depth of 4 or 5 inches.

11. Sow the large lot of Superphosphate on one plot; the large lot of Muriate of Potash on another plot; and the small lot of Superphosphate and small lot of Muriate of Potash both on the plot for the mixed fertilizer. Stir the fertilizers in the ground to a depth of 1 or 2 inches.

12. Mark out each plot into ten rows one way by five rows the other way, allowing 3 feet 4 inches between the rows.

13. Plant five kernels of Corn at each of the places where the lines touch, and thus make fifty hills on each of the six plots.

14. When the plants are about three inches tall, sow the large lot of Nitrate of Soda on one plot, and sow the small lot of Nitrate of Soda on the mixed fertilizer plot on which the other two small of fertilizers were sown. Stir the surface of all six plots to a depth of 1 or 2 inches.

15. When the plants are six inches tall, thin out to four plants per hill.

16. Cut the Corn as soon as it has ripened sufficiently. Weigh the crop from each plot as soon as cut and then husk, weigh and count the ears.

17. When the ears have become sufficientliy dried, shell the corn and then weigh the grain of each variety.

18. Examine your report carefully and see that all the facts of the experiment are entered correctly.

19. Make a copy of the report and keep it yourself for future reference.

20. Kindly forward the report to Director of Co-operative Experiments, Agricultural College, Guelph, Ont., as soon as possible after harvest.

The report on the work is sent in on a special form with a statement of the conclusions reached. These reports are examined carefully, accepted if satisfactory, or rejected if the observations and conclusions show evidence of faulty experimenting. Of course, in some cases, failure through unavoidable circumstances has to be reported. Succeeding years show, however, improved practice by our farmers in this work. A sample form is shown here as a suggestion of something that could be

similarly done in any rural school with the field crops. For example, scholars might draw a map of their fathers' farms and keep a record from year to year of the products of each field.

This form is the one used for Experiment No. 1, 1906, a test of different varieties of oats :—

VARIETIES.	Date of Seeding.	Date of Maturing.	Strength of Straw.	Amount of Rust.	Amount of Smut.	Weight of Whole crop on each plot.	Weight of Grain on each Plot.	Nature of Soil.	Cropping in Previous Year.	How and when last Manured.

Was this test made according to instructions in all particulars?.....

Did 1,000 people see your experiment?.....

For your soil, which variety do you consider best?.....

Second best?..... Third best?..... Poorest?.....

What variety of oats is grown most extensively in your County?.....

What is the most important result which you have obtained from this experiment that is likely to be of value to you in the future?.....

.....

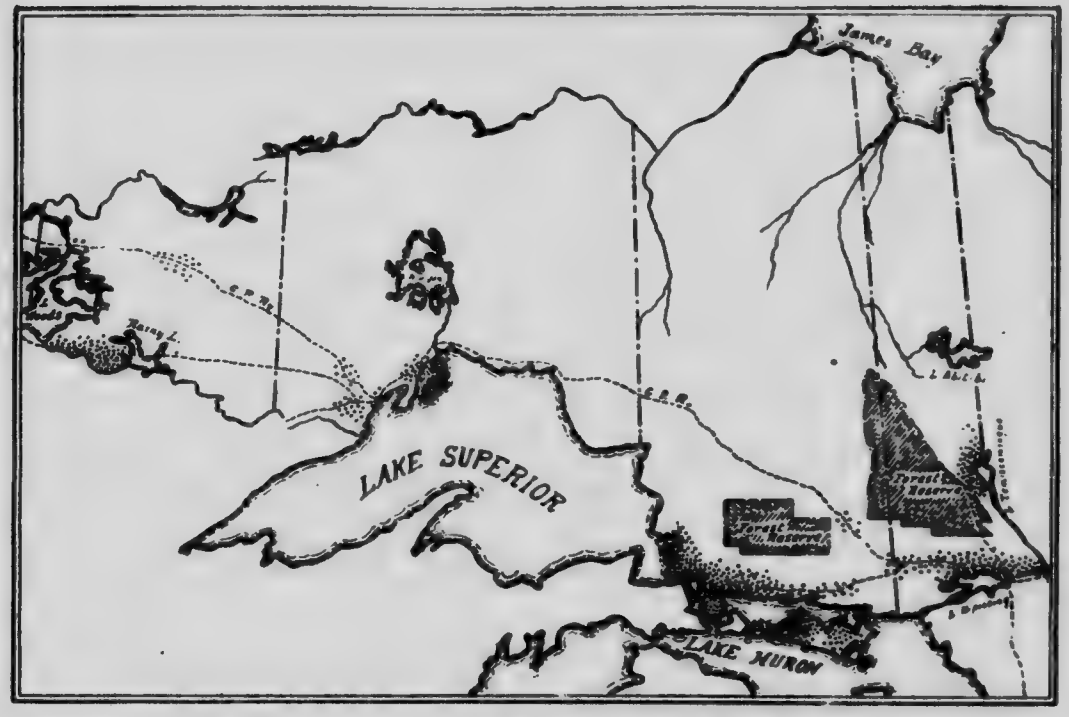
.....

A summary of the results of the experimenters throughout the whole Province is made at the central bureau. This is reported on at the Union's annual meeting in December, and is included in the annual report, which is published and distributed free as a Governmer port. Thus, for twenty years, many of our best farmers have been p ically solving for themselves the questions of best seed, best manuring, and best cultivation of the soil.

The work is not finished yet. It is only well commenced. Only a small fraction of the community has been reached. The school may well assist in the uplift, for it will share in the uplift. It makes for closer observation, for more intelligent thinking and doing in the common affairs that have been too long regarded as not needing thought and care. It makes for increased productiveness of land and consequent improved conditions of living.

MAP SHOWING CO-OPERATIVE EXPERIMENTS IN OLD ONTARIO.

Each Dot Indicates a Co-Operative Experiment in Field Agriculture in 1904. In addition to these, there were 393 experiments in Horticulture.



MAP SHOWING CO-OPERATIVE EXPERIMENTS IN NEW ONTARIO.
Each Dot Indicates a Co-Operative Experiment in Field Agriculture in 1904.

Pine. Black Locust. Ash. Oak. Tulip-tree. Elm. Red Maple.

Forest nursery grounds at O. A. C. To the left of the picture are seen the white pine seed beds, with screens for shading the 75,000 one year old seedlings. These plants are for distribution throughout the Province.

CO-OPERATIVE EXPERIMENTS IN FORESTRY.

This branch of the Union work is not completely organized yet. There is one forest nursery established at the College, but its output is limited. A larger one has been equipped this summer to meet the demands of the Province.

For the season of 1907 some seedlings may be ready, and at any rate seeds will be available for distribution to the schools. However, it is not necessary here as in agriculture and horticulture to develop improved varieties. Our forest trees are valuable for their wood and not for their fruits. Seeds that are as good as any imported may be gathered everywhere. This will be an especially attractive side of the nature study collecting. A list is given of the commoner trees, the seed of which it would be profitable to propagate.

Up to the present, the work has been along the line of reclaiming waste land. From now on help will be available to those wishing to improve neglected farm wood lots. It is in this line that the school's interest may be directed. Much can be done by calling attention to improper conditions and suggesting lines of improvement. It is not meant that the teacher's office is to come forward and point out mistakes; he would serve a good cause poorly by doing that as a rule. But by the direction of observation, he may lead the children to see the mistakes for themselves.

This directive work may be done incidentally while following the line of work suggested in the departmental Course of Study, viz. :—Form I : *Collecting and studying autumn leaves;* Form II. : *Forms and uses of trees; forestry and lumbering operations; pioneer life of district:* Form III. : *Culture of shade trees; identification of common forest trees:* Form IV. : *Buds and twigs; woods : rings, grain, bark, uses, etc.; forest plant life.*

Nature study teaching here fails in its largest function if it does not lead to a *doing* on the part of the scholar which will be of life value. And while the collecting, pressing, and mounting of leaves, the collecting and identifying of seeds, the polishing and mounting of different kinds of woods, have their proper share in the education of the boy, they must not be considered an end sufficient in themselves. They are for his youth. The end which is outward and visible should be rather an improvement in regard to the planting and care of shade trees at home and at school, and of wood lots on his own farm or on municipal waste lands. This may come into active evidence only after school days, but it is the school's part in education nevertheless. The real end of it all is inward and invisible; it is the development of a character through an interest in the shaping and controlling of one of nature's grandest products—trees.

The teacher in the one-room rural school is not expected to teach technical forestry as it is taught in the schools of Germany or at this College. His function is directive. He leads his pupils to observe the conditions of the surrounding woods. He instructs him in proper conditions. He gets him to feel that there is need for improvement. He encourages him in the attempt, and directs him to the proper source for information and help. It may be that only one boy or one girl is stirred

to the problem. But schools are made up of single boys and girls. And modern education is for *individuals*, not for *classes*. It may be a parent or ex-pupil whom the teaching reaches. This is good, too. It is the teacher's work, no less.

For the care of wood lots the following suggestions are offered:—

1. Cattle should be kept out, as they prevent reproduction by browsing off seedlings, and by trampling the ground hard great loss of moisture by evaporation occurs.

2. Protective belts of coniferous trees such as White or Norway Spruce should be planted on the edges. The prevailing south-west winds in summer are very drying in an open woods. Fall winds tend to drive the leaves to the fences and prevent formation of the necessary humus.

3. Inferior species of trees, such as Hawthorns and Ironwood, should be removed, and their places filled with species of value. This may be done by dibbling in seed. Enquiry regarding the valuable trees that were originally on the land will be the key to the planting.

4. Defective and over-mature trees should be removed. It is a mistake to think that a tree goes on forever improving. New trees might just as well be growing in their place.

5. Open spaces that have become grass or weed-grown should be cleaned and filled up with nursery stock.

Our forest trees that should be cultivated:

Species.	Time to collect seeds.	Time to sow seeds.	Storage.	Height of one year old seedlings.
White pine	Last of August, September.	Spring.	Dry and cold.	2½—3½ inches.
Tamarack	September.	"	"	2—3 "
Black spruce	Sept. and Oct.			1½—2½ "
White spruce	"	Spring.	Dry and cold.	1½—2½ "
Norway spruce	"	"	"	1½—2½ "
Hemlock	"	"	"	2—3½ "
Balsam fir	"	"	"	
White cedar	"	"	"	1½—2½ "
Willows and poplars	July.	Sow at once.		
Basswood	October.	Spring or fall.	Bury in sand.	6—12 "
Black walnut	Sept. and Oct.	"	"	10—14 "
Butternut	"	"	"	10—14 "
Hickory	"	"	"	6—9 "
Chestnut	Oct. and Nov.	"	"	
Beech	"	"	"	
Oaks	Sept. and Oct.	"	"	5—9 "
Elms	May and June.	Sow at once.		5—10+ "
Sugar maple	October.	Spring or fall.	Bury in sand.	6—12 "
Manitoba maple	Oct. and Nov.	"	"	
Silver maple	May and June.	Sow at once.		12—20 "
Red maple	"	"		6—10 "
Ashes	October.	Spring or fall.	Bury in sand.	
Black cherry	August.	"	Dry & cold best.	8—14 "
Locusts	October.	"	Bury in sand.	Black 18—20+ Honey 6—14
Sycamore	Oct. and Nov.	"	"	
Tulip-tree	October.	"	"	

STORING SEEDS FOR WINTER.

The usual method of storing seeds is known as *stratification*. Layers of the seeds are spread in a box with layers of sand alternating. The covered box is buried in sand then for the winter. If different kinds of seeds are being kept, sheets of paper should separate them. The aim is to have the seeds cold and comparatively dry. The box may be kept in a cold cellar so long as the seeds do not dry out. After taking up the seeds and before pi ing in the spring, care should be taken that they do not lose vitality through drying.

A small plot of ground in the home garden may be used for a seed bed. The boy and his father may well work together in this project, as the matter concerns the future value and beauty of the home property. It will be well to confine operations to a few species such as experience or observation proves to be well suited to the locality. Horse-chestnut or Mountain ash, etc., might be added if such were wanted r the house. The seedlings must be kept free of weeds, and the ground cultivated. The conditions or amount of shade that obtain in their forest home should be given the seedlings in the garden, if possible.

The seedlings of conifers, such as pine or spruce, are prepared for final setting out by *transplanting to nursery lines*. This is needed in order to have the plants develop a good root system. If seedlings get two years in the seed bed, one year may suffice in the *nursery lines*, but in any case they must have room for growth of roots. They are best transplanted in the spring in our latitude. If their roots are straggling, they should be pruned back somewhat so as to encourage a short, fibrous condition. Then they are set in rows at sufficient distances to allow for growth and cultivation. Seedlings of the hardwoods, such as ash, elm, oak, may be set out in final location at the end of first year, as they are generally sufficient in root and height at that age.

Wild seedlings of conifers and hardwood trees may be advantageously reared in the school or home nursery. They should be lifted carefully in early spring or in autumn, protected in transit from the woods to the nursery, and properly set.

Naturally the school will come in for a supply of young trees to set out about its grounds. Or if the seed bed and nursery are at the school, distribution can be made through the neighborhood.

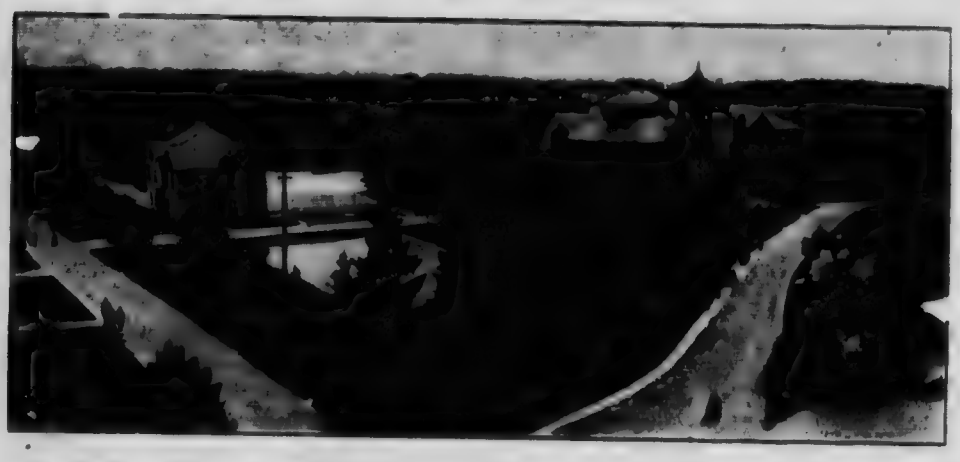
For information regarding the distribution of nursery stock address *Forestry Department, O.A.C., Guelph, Ont.*

CO-OPERATIVE EXPERIMENTS IN HORTICULTURE.

The Union has carried on co-operative experiments in horticulture for twelve years. As there is more expense in distributing nursery stock than there is in sending out grain, the number of experiments is smaller than in agriculture. Hitherto the work has been confined to small fruits, but this year grapes and app added to the list. With the increasing attention paid to the g nd orchard throughout the Province, the interest in this work is ading.

Professor Hutt, as Director of this branch, reports for 1905 as follows :—

"The co-operative testing of small fruits was begun in a small way twelve years ago with sixty experimenters. Each year since then the work has grown steadily, and this year plants were sent to 532 experimenters. During this time we have sent out material for 3,183 experiments. This has been distributed among about 2,000 experimenters scattered in all parts of the country. These tests are now being conducted in every county and district in the Province, and a pleasing feature of the work is that they are being most eagerly taken up by the settlers in the newer and northern sections of the country, where he greatest encouragement to amateur fruit growing is needed.



Horticultural Department O. A. C. Massey Library and Biological Building.

In some particulars this co-operative experimenting in fruit growing is different from that in grain growing, and in many ways there are more difficulties to be overcome. In the first place, there is more danger of failure through loss of the plants in shipment and planting. Many of the experimenters have had little or no previous experience in growing fruit. Then the results are not concluded at the end of the first season, for that is only the beginning of the work, and some who make a good beginning are unable to carry it on through several years to a satisfactory conclusion. But notwithstanding all these difficulties, we are pleased with the progress that has been made, and with more funds for carrying it on we hope to make much greater progress in the future."

It must be understood that it is not desired to have this used as a scheme for getting something valuable for nothing. Things so secured are, as a rule, little cared for. A responsibility attaches to a request for an experiment. The recipient, as in the agricultural division, agrees (1) to follow the directions furnished; (2) to properly care for the plants, and (3) to report the results of growth and yield at the end of each season as requested. But when the boy or girl, or school, or farmer is ready to take this up as a part of his education and to follow it up consistently, the plants may be secured.

To show the extent of this branch of the work, the list of experiments for 1906 is given. It may be noted, too, that the varieties mentioned can be taken as a safe guide in selecting nursery stock for Ontario gardens. They are only sent out for wider testing after being selected by years of testing at the College and the fourteen Provincial Experimental Fruit Stations.

No. 1. *Strawberries*—Splendid, Clyde, Tennessee, and Irene—12 plants of each.

No. 2. *Raspberries*—Cuthbert, Golden Queen, Marlboro', and Columbian—6 plants of each.

No. 3. *Black Raspberries*—Gregg, Kansas, Palmer, and Older—6 plants of each.

No. 4. *Blackberries*—(Adapted only to *Southern sections of Ontario)—Agawam, Eldorado, Kittatinny, and Snyder—6 plants of each.

No. 5. *Currants*—Fay, Red Cross, Victoria, and White Grape—2 plants of each.

No. 6. *Black Currants*—Champion, Lees, Naples, and Black Victoria—2 plants of each.

No. 7. *Gooseberries*—Downing, Pearl, Red Jacket, and Whitesmith—2 plants of each.

No. 8. *Grapes*—(For *Southern Ontario)—Concord, Wilder, Niagara, Lindley, Brighton, and Vergennes—1 vine of each.

No. 9. *Grapes*—(For *Northern Ontario)—Champion, Worden, Winchell, Delaware, Lindley, and Moyer—1 vine of each.

No. 10. *Apples*—(For *Southern Ontario)—Primate, Gravenstein, McIntosh, Blenheim, Rhode Island Greening, and Northern Spy—1 tree of each.

No. 11. *Apples*—(For *Northern Ontario)—Transparent, Duchess, Wealthy, McIntosh, Scott's Winter, and Hyslop Crab—1 tree of each.

Cultural directions accompany each experiment. Those for Nos. 10 and 11 (1906) are given as an example and trust they may enable a teacher to direct observation on orchard conditions as a part of the nature study work of the school. There are few sections of the country where neglect of fruit trees is not to be seen. The school may legitimately attack the condition. Observation and intelligence will be sure to lead to improvement.

Apples in Ontario.

1. Select a high, well-drained site, protected, if possible, from the strong prevailing winds, and prepare the land deeply and thoroughly.

2. When transplanting, cut back all torn or injured roots to fresh, sound wood; avoid exposure of the roots to the sun or drying winds; dig holes large enough to admit the roots without cramping; cover with moist, mellow surface soil and tramp firmly.

3. Set the trees far enough apart to allow for full development. This will depend largely upon the locality and soil. Observe the distance required for full grown apple trees in your neighbourhood. In Northern Ontario this will vary from 25 to 35 feet. In Southern Ontario from 30 to 40 feet.

* This division of the Province into North and South may be approximately made by a line running from Collingwood to Kingston.

4. As a precaution against sun-scald it is best in Northern sections to allow the trees to form low heads, with trunks about two feet high. Prune the lower branches up to the desired height, and leave three or four main branches to form a well balanced top. In southern sections the head may be formed at any desired height.

5. Prune regularly every spring, thinning out as much of the new wood as may be necessary to prevent the top becoming too dense. Careful annual pruning avoids the necessity of cutting out large limbs when the trees get older.

6. Do not allow adjoining crops to encroach upon the trees. To insure good growth, it is best to give clean, thorough cultivation from early spring till about mid-summer, after which the trees should mature their wood for winter.

7. A cover crop of some kind, such as rye, clover, or hairy vetch, sown after the last cultivation in mid-summer, is valuable for root protection in winter, and to enrich the soil when it is plowed under next spring.

8. The fertility of the soil about the trees may be most economically maintained by the judicious use of leguminous cover crops, and occasional applications of unleached wood ashes, spread evenly over the ground as far out as the roots extend.

9. Guard against girdling by mice by banking earth against the trunks in the fall, wrapping the trunks with building paper, or tramping the snow firmly around the trunks from time to time after the first heavy snowfall.

10. Watch out for borers on the trunks near the ground every summer, and cut them out as soon as they are found to be at work.

11. Protect the trees against the ravages of insects on the foliage by spraying, or by removing the insects by hand until the trees get too large for such a method.

12. Experimenters wishing fuller information on any of these points should send for our Bulletin on Apple Culture, which will be sent free on application.

The reports are made on a printed form, summarized and published. This is the form used:—

VARIETIES.	No. Planted.	No. Lived.	Yield (in oz.)	VIGOR OF GROWTH.
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....

Remarks .....

For information regarding co-operative work in horticulture, address *Horticultural Department, O.A.C., Guelph, Ont.*

Hardy Perennial Borders.

Many schools, which cannot undertake formal gardens, have successful borders along the walks or fronting the building. They afford good material for observation, composition and art work. These borders

afford, too, a means of distributing flowers into the homes, or of bringing home flowers to the school. The reciprocity in such a delightful community of interest is good for both school and home. The children should be the *owners* of the border. It should be remembered that it is not for the school nor for the teacher primarily, but for the *children*. It is to be part of their education, bringing forth results that arise from working together to attain a laudable purpose.

Hardy perennial border at O. A. C.—a very desirable feature on public or private grounds.

In establishing a perennial border, it is well to remember that if given a chance it will become a permanent thing. The ground should, therefore, be well prepared and made as rich as possible by digging in plenty of well-rotted manure or compost. Planting may be done more or less throughout the entire season, depending upon the nature of the plant, but with most plants it can best be done in the spring, most of the bulbs, of course, being planted in the fall.

The best arrangement of the plants in the border must be learned more or less by experience, and rearranging may be done from time to time as may be desired. An irregular profusion is on on the whole the most pleasing. It is well, therefore, to avoid planting in straight lines or square blocks. Usually the best effects are produced by grouping a number of one kind together so as to present a mass of color when in bloom.

Naturally the smaller growing kinds should be placed near the front, and the taller kinds in the background, or in the centre if the border is seen from both sides. Many kinds are at their best early in the season, and their tops die down before midsummer, while others come on later and last till the end of the season. These should be so grouped and fitted in with each other that the space left by the dying tops of the early ones will be filled by the later ones. In this way the border may be made to present an attractive appearance throughout the whole season.

The annual care required to keep a border in good condition consists in (1) removal of all dead tops in the spring, (2) dividing and thinning out those kinds which tend to spread too much and crowd out neighboring plants; (3) introducing new kinds from time to time as they may be procured; (4) keeping out weeds and loosening the ground whenever it may be bare and have a tendency to become crusted.

The following list includes 50 of the most desirable kinds growing in our borders. Those marked * are what would be selected as the best 25. Brief notes are added stating how each is propagated.

Achillea "The Pearl"—Seeds and division.
Adonis Vernalis (Spring Adonis)—Seeds.
Agrostemma coronaria (Mullein Pink)—Seeds.
*Aquilegia chrysantha (Golden Columbine)—Seeds.
*Aquilegia coerulea (Rocky Mountain Blue Columbine)—Seeds.
Asclepias tuberosa (Butterfly Weed)—Seeds and roots.
Aster Novae Angliae (Wild Purple Aster)—Division.
*Bellis Perennis (English Daisy)—Seeds.
Bocconia cordata (Plume Poppy)—Division.
*Calliopsis lanceolata—Seeds.
*Campanula carpatica (Carpathian Bells)—Seeds.
Campanula media (Canterbury Bells)—Seeds.
*Convallaria majalis (Lily of the Valley)—Division.
*Crocus in variety—Bulbs.
Corydalis nobilis—Seeds or roots.
*Delphinium hybridum (Larkspur)—Seeds.
Dianthus barbatus (Sweet William)—Seeds.
*Dielytra spectabilis (Bleeding Heart)—Division.
*Digitalis (Foxglove)—Seeds.
Doronicum caucasicum—Seeds and division.
Epimedium alpinum (Barren-wort)—Division.
Funkia subscordata grandiflora (Giant Day Lily)—Division.
*Gaillardia grandiflora—Seeds.
Gypsophila paniculata (Baby's Breath)—Seeds and division.
Helenium grandicephalum straitum—Division.
*Hemerocallis flava (Yellow Day Lily)—Division.
Helianthus multiflorus (Double Sunflower)—Division.
Hollyhock—Seeds.
*Iris Germanica (German Iris)—Division.
*Iris Kaempferi (Japanese Iris)—Division.
*Lilium in variety—Bulbs.

Lychnis chalcedonica—Seeds.
Mertensia virginca (Blue Bell)—Roots.
Myosotis (Forget-Me-Not)—Seeds and division.
*Narcissus in variety—Bulbs.
*Paeonia (Paeony)—Roots.
*Papaver nudicaule (Iceland Poppy)—Seeds.
*Papaver orientale (Oriental Poppy)—Seeds.
*Phlox, hybrid perennials in variety—Division.
*Phlox subulata (Moss Pink)—Division.
Platycodon grandiflora (Chinese Bell Flower)—Seeds.
Pyrethrum uliginosum (Giant Daisy)—Seeds and division.
*Rudbeckia lanceolata (Golden Glow)—Division.
Scilla Siberica—Bulbs.
Spiræa filapendula (Dropwort)—Division.
*Tulips in variety—Bulbs.
*Valeriana officinalis (Garden Heliotrope)—Division.
Veronica in variety—Seeds and division.
Vinca minor (Periwinkle or Trailing Myrtle)—Plants.
*Viola corunta (Tufted Pansy)—Seeds and division.

Best Selection of Annuals.

For children's flower gardening in connection with school work, the annuals have an advantage. In one season germination of seed, full growth of plant, flowering and seeding, can be watched. In many cases reward of bloom comes in eight or ten weeks, or before the summer holidays. This leaves the fall nature study, plant work, for fruits, leaves, etc. If there is to be an exhibit in the fall, some of the plants should be potted and in that case, of course, only the shorter stemmed plants should be used.

A selected list of annuals suitable for the children's gardens is given, but where reasonable individual preferences for other plants are shown the list may well be enlarged.

Antirrhinum (Snap Dragon).
Aster.
Calendula (Pot Marigold).
Calliopsis.
Candytuft.

Centaurea (Corn Flower).
Convolvulus (Morning Glory).
Dianthus (Pink).
Eschscholtzia (Californian Poppy).
Gaillardia.
Gypsophila (Baby's Breath).
Gladioli.
Gourds.
Helianthus (Sun Flower).

Delphinium (Larkspur).
Malope.
Marigold, French and African.
Mignonette.
Mirabilis (Marvel of Peru or Four o'Clock).
Tropæolum (Nasturtium).
Pansy.
Poppy.
Phlox Drummondi.
Portulaca.
Salpiglossis.
Wall Flower.
Sweet Pea.
Zinnia.

SOWING.—In growing annuals, the following directions should be observed by the children:—

(1) The soil should be medium rich with manure, and porous with sand, deeply cultivated and very finely pulverized. Children are inclined to put in the seed without sufficient working of the ground.

(2) The seed should not be sowed while the ground is still cold, nor when it is very wet.

(3) Small seeds require the least possible covering; sifting fine light soil over them is sufficient, but for larger seeds a covering of about three times the diameter of the seed is needed.

(4) The soil covering the seeds should be firmly pressed in order to ensure moisture for their sprouting.

(5) Shading and sprinkling will be needed at first.

If this work is done in the school room in window boxes a gain in time is secured, but the results are more uncertain, and the children lose the training and enthusiasm that result from acting independently.

THINNING, TRANSPLANTING.—

(1) The small plants should be thinned out as they grow and transplanted into their final location in the flower bed or pot.

(2) This work is best done in cloudy weather and if the sun comes out strong shade should be provided.

(3) Tall, slender plants will need to be tied to stakes.

(4) Plants should not be set too closely together in the beds; the distance apart should be not less than half the height of the plant.

(5) Best effects are produced by having the different kinds of flowers kept distinct in separate patches.

LEADING VARIETIES OF VEGETABLES.

For the information of teachers or associations, there is offered here a list of our leading varieties of vegetables, and brief cultural directions. It is the result of thirteen years of testing in the gardens of the Horticultural Department and issued in Professor Hutt's report for 1905. The information can be used as a basis for directing the observation of children in the home gardening operations of their parents as well as guide to their own gardens.

ASPARAGUS. Conover's Colossal and Palmetto. Plant in rows 4 feet apart and 2 feet apart in the rows; apply manure liberally and cultivate thoroughly.

BEANS. *Summer*—Golden Wax. *Autumn*—Bush Lima. *Winter*—Navy. Sow when danger of spring frost is past.

BEETS. *Globe*—Egyptian Turnip. *Long*—Long Smooth Blood. Sow as soon as ground is fit to work. Thin when small to three inches apart and take out every other one as soon as they are large enough to use.

CARROTS. Chantenay and Scarlet Nantes. Sow early and thin the same as beets.

CABBAGE. *Early*—Winningstadt. *Late*—Flat Dutch and Savoy. *Red*—Mammoth Rock. Sow seed of early variety in hot bed about

middle of March, and transplant to open ground about end of April. Sow seed of late varieties in the open ground about end of May, and transplant about first of July.

CAULIFLOWER. Extra Early Erfurt and Early Snowball. Treat the same as cabbage.

CELERY. *Early*—White Plume. *Medium*—Paris Golden Yellow. *Late*—Giant Pascal. Sow seed in seed box or hot bed about first of May. Prick out into flats or cold frame, when about an inch high, and transplant into trenches 4 or 5 feet apart about first of July.

CORN. *Early*—Golden Bantam and White Cory. *Medium*—Metropolitan. *Late*—Country Gentleman, and Stowell's Evergreen. Sow about first of May and if plants are injured by cold or frost sow again about 24th of May.

CITRON. Colorado Preserving. Sow in hills about 8 feet apart when danger of frost is over.

CUCUMBER. White Spine, for slicing. Cool and Crisp for pickling and slicing. Sow in hills about 4 feet apart when danger of frost is over.

EGG PLANT. New York Improved. Sow seed in seed box or hot bed about middle of April, and transplant in the open when danger of frost is past.

KOHL RABI. Early Purple Vienna. Sow seed early for summer use and again about middle of June for winter use.

LETTUCE. Hanson and California Cream Butter. Sow seed as early as possible, and at intervals of a month for succession. Thin plants to 6 or 8 inches apart for good heads.

MUSKMELON. Rocky Ford or Emerald Gem and Montreal Market. Sow seed in well prepared hills when danger of frost is past.

ONIONS. Yellow Danvers, Prizetaker, and Red Wethersfield. Sow seed as early as possible. The thinnings may be used as green onions.

PARSNIPS. Hollow Crown. Sow as early as possible and thin to 6 inches apart in row. Leave part of the crop in the ground over winter for spring use.

PEAS. *Early*—Steele-Briggs' Extra Early. *Medium*—Gradus. *Late*—Champion of England. Sow early kinds as early as possible and others a couple of weeks later.

POTATOES. *Early*—Early Ohio. *Late*—Empire State. Keep potatoes for early planting in a warm room in the light for three weeks before planting. Plant a few for early use as soon as ground is fit to work, and follow with others when danger of frost is past. Plant late varieties about 24th of May.

PUMPKIN. *Small*—Sugar. *Large*—Jumbo. Plant when danger of frost is past.

RADISHES. *Early*—Rosy Gem and French Breakfast. *Winter*—Scarlet China. Sow early varieties as early as possible, and at intervals of two weeks for succession. Sow winter varieties in summer after crop of early peas.

RHUBARB. Victoria, or any other carefully selected seedling variety. Plant 4 feet apart. Manure liberally, cultivate thoroughly, and break seed stalks as they appear.

SALSIFY. Long White. Sow as early as possible, and thin to four inches apart in the row. Part of the crop may be left in the ground over winter for spring use.

SPINACH. Victoria. Sow as early as possible, and at intervals of a month if succession is desired.

SQUASH. *Summer*—Crookneck and White Bush Scallop. *Winter*—Hubbard. Do not plant until danger of spring frost is over. Bush varieties require about 4 feet of space between hills. Hubbard should have at least 8 feet.

TOMATOES. *Early*—Earliana, Dominion Day, and Mayflower. Sow seed in seed box or hot bed about the middle of April. Transplant in the open when danger of frost is past.

TURNIPS. Golden Ball and Hartley's Bronze Top. Sow early for summer use and about June 20th for winter use.

VEGETABLE MARROW. Long White Bush. Plant when danger of frost is past.

WATERMELON. Hungarian Honey and Cole's Early. Plant when danger of frost is past in well prepared hills 8 feet apart.

CHILDREN'S GARDENING.

In many towns and cities this line of educational work has the encouragement and direction of the Horticultural Society. A seed distribution takes place in the spring to the children at the schools. Instruction is given in preparation of soil, planting of seed, and care of growing plant. In the fall an exhibit is held and in most cases prizes are awarded. Midland, Simcoe, Niagara Falls South, Cardinal, Brantford, Peterborough, Hamilton, Cobourg, Chatham, Guelph, and Ottawa are some of the places that have used this method and found it good, at least from the society's standpoint. Children were trained into a regard for plants. It must be remembered, however, that to get the most educational worth from it, the co-operation of the teacher is essential. The growing of the plant must be used in the geography, the literature, the composition, the drawing, and the nature study of the school programme to vitalize these subjects; not overdoing it, though, so that things are seen out of proportion and joy and spontaneity are smothered.

In Chatham the school fair includes many other exhibits besides those from the gardens. Exhibits of writing, drawing, map drawing, exercise books, color work, nature study collections, manual training work in clay, paper, cardboard, woodwork, etc., pet animals, and picture postcards are also made. It is a good means of educating parents on the work of the school, and invariably leads to an active sympathy between school and home.

In St. Thomas, the organization of the Horticultural Society was due to the initiative of the teachers and children. The Teachers' Association buy the seeds and direct the distribution. In 1904, a commence-

ment was made with flowers for each class. The following was the selection, and only four seeds were given to each pupil:—

Jr. 1st—Dwarf Nasturtium.	Jr. 3rd—Mimosa.
Sr. 1st—Balsam.	Sr. 3rd—Ageratum.
Jr. 2nd—Calliopsis.	Jr. 4th—Ten Weeks' Stock.
Sr. 2nd—Centaurea.	Sr. 4th—Verbena.

Teachers—Chrysanthemum carinatum and Asters.

In 1905, vegetables and one tree were added to the list, and the selection was as follows:—

Junior 1st grade—Nasturtium and Parsley.
Senior 1st grade—Pansy and Sweet Corn.
Junior 2nd grade—Centaurea and Sugar Beet.
Senior 2nd grade—Phlox and Celery.
Junior 3rd grade—Canadian Peanuts and Verbena.
Senior 3rd grade—Asters and Catalpa.
Junior 4th and Senior 4th—Cosmos and Broom Corn, Asters.

The exhibit took place in a central place on September 21st and 22nd, and naturally aroused a great deal of interest. This year it is expected to have a garden at each school. It will be a natural outcome of the individual home gardening.

THE CLEVELAND ASSOCIATION.

The work of *The Home Gardening Association, Cleveland, Ohio,* has attracted wide attention and is suggestive. It is similar in its operations to some of our Horticultural Societies, but has grown greatly beyond its local bounds. Its work commenced in the schools of Cleveland, and produced marked improvement in the home conditions throughout the city, especially amongst the foreign element. In 1905 over 238,000 packets were distributed in the city alone through the schools, while forty-seven outside organizations were supplied with 150,000.

Its organization for distribution of seeds is suggestive, too. In the first place, the seeds must be bought; no pauperization can be allowed nor can any seeds go where they will be unappreciated. The Association provides the schools with large "order envelopes" for $1.75 per 1,000; these are distributed to the children who desire to order and returned next day with money and order. Then at the central offices the orders are placed in the envelopes and returned to the schools. This is done before March 1st. Direction cards are sold to the schools for $1.35 per 1,000 and distributed with the handing out of the seeds. The seeds are sold at $9.25 per 1,000 packets, so that the one cent per packet paid by the children covers the entire cost. Organizations or schools outside receive the packets in wholesale lots and fill the order envelopes for themselves.

ORDER ENVELOPE.

THE HOME GARDENING ASSOCIATION

Seeds for 1906. Price 1c a Packet

Mark opposite the variety the number of packets wanted. Separate Col[illegible] to be Ordered

ASTER, mixed. Scarlet, White and Rose, 15 inches high.		**MORNING GLORY**, a climb[illegible], Mixed Colors, 12 feet high.	
BACHELOR'S BUTTON OR CORNFLOWER, Mixed, Blue Pink and White, 2 feet high.		**NASTURTIUM**, a climber, mixed, Yellow, Orange and Red, 6 feet high.	
BALSAM OR LADY SLIPPER, Mixed Colors, 18 inches high.		**PHLOX**, mixed (annual) Scarlet, Pink and White, 1 foot high.	
CANDYTUFT—Mixed, White, Pink, and Red, 1 foot high.		**CHINA PINKS**, mixed, Pink, Scarlet, White and Lilac, 6 inches high.	
FOUR-O'CLOCK, Yellow, White and Crimson, 2 feet high.		**VERBENA**, mixed, White, Scarlet, Purple, 6 inches high.	
MARIGOLD, French, Yellow and Brown, 1 foot high.		**ZINNIA**, Scarlet, 2 feet high.	
SCABIOSA, or Pincushion, mixed, Red, Lilac and Pink, 1½ feet high.		**SUNFLOWER**, Small, Yellow flowers, 2 feet high.	

Vegetable Seeds

BEETS, 9 inches high, Plant about April 25th		**ONIONS**, 1 foot high, Plant about April 15th.	
BEANS, bush, 1 foot high, Plant about May 1st.		**RADISHES**, 6 inches high. Plant about April 15th.	
CARROTS, 6 inches high, Plant May 15th.		**SWEET CORN**, 6 feet high, Plant about May 15th.	
LETTUCE, 9 inches high, Plant about April 15th.		**SPINACH**, 6 inches high, Plant about April 15th.	

Return this envelope to the teacher, with your money. Do not put money in this envelope.

No. of packets..... Amount.....cents.

Write your name here.....

Address .....

School..... Grade..... No. of Room.....

Your seeds will be delivered to you in this ENVELOPE about April 15th. Prepare your garden early in April. Select the sunniest part of your yard, but avoid a place where the drippings from the roof will fall on the bed. Dig deep—a full foot—and break up the lumps. Soil with well-rotted manure dug in will give better results than poor soil. Vegetables require good, rich soil.

Beautify your place by having a good lawn about the house.

Mark quantity wanted.

Lawn Grass seed 5 cents a packet, sufficient to plant 12 by 12 feet.

DIRECTION CARD

THE HOME GARDENING ASSOCIATION

1906

Directions for Care of the Garden

Plant seeds in garden or boxes early in May.
Fill boxes with four or five inches of fine, rich soil.
Place boxes in sunny place, and sprinkle every day.
Cover boxes at night, if very cold.
Transplant seedlings to the garden about June 1st, on a damp day.
Sow seeds of Nasturtiums, Morning Glories, Sunflowers and Four-O'clocks in the garden, as they do not stand transplanting.

Suggestions for Window Boxes

Make the box six or eight inches deep, twelve to fifteen inches wide, and as long as the window is wide.
Fill the boxes with fine rich soil and fasten firmly to the sunniest window.
Place similar boxes on the porch or fence.
Plant Morning Glories on the side nearest the house and train up on strings.
Plant Climbing Nasturtiums near outside to hang down over the box.
Plant Zinnias, Marigolds, Asters, Phlox or Verbenas in middle of box.
Plants should stand four or five inches apart.
Boxes need water every day.

Making of Flower Beds

Select sunniest part of the yard.
Avoid a place where the dripping from the roof will fall on the bed.
Best effects are produced by planting all of one variety in one place.

Preparation of the Soil

Dig up the bed as early as possible, a foot deep.
Mix with the soil some rich earth, well rotted manure, or leaf mould from the woods.
Rake the beds and keep the soil fine and free from lumps.

Watering of the Garden

Sprinkle the beds every day, if necessary, until the plants are one inch high.
Do not allow the soil to become dry.
Sprinkle thoroughly every few days, when the plants are two or three inches high, instead of lightly every day.
Water in the morning and evening.
If the soil is raked often between the plants they will not require as much watering.

Thinning of Plants in the Garden

Avoid having plants too crowded.
Thin the plants when they are two or three inches high, on a cloudy day when the soil is moist.
Transplant seedlings pulled up to another bed, or give them to some friend.
Take up a little soil with each plant.
Use a trowel, an old kitchen fork or a small, flat, thin stick.

Picking of Flowers

Do not allow flowers to go to seed.
Pick them every day and more will bloom.
Allow a few of the best flowers to go to seed for next year's garden.
Keep beautiful, fresh flowers in your house and share them with the sick.

The Lawn

Take care of the lawn all summer.
Water well, when needed, and do not allow the surface to become dry.
Keep the lawn neat by cutting the grass when two or three inches high.
Pull out the weeds.

The Vegetable Garden

Select a sunny place in the back yard. Dig up the bed and thoroughly enrich the soil. Crisp, tender vegetables must be grown quickly. Keep the ground well stirred and free from weeds. Plant lettuce, onions, spinach and beets as soon as the ground can be worked.
Allow space for a succession of plantings during the summer.

THINGS TO REMEMBER

Dig deep and make soil fine on surface.
Keep pulling out the weeds all summer.
Sprinkle the seeds every day.
Water the bed thoroughly every few days during the whole summer.
Pick your flowers every day.
Keep your garden neat.
Flowers require attention all summer.
By attending to these things you will have flowers all summer and for the Flower Show in the fall.

If our Teachers' Associations were to undertake the work along similar lines, it would lead to uniformity of effort and teaching in the schools of the district. As it is now, very often, each school follows its own bent, and the advantage of comparison is lost. Stimulus would come to the backward schools that hesitate to undertake new lines of work. At Association meetings, definite and helpful discussion could be had on the best way of using this branch of the nature study teaching. Comparative exhibits of art work, composition, note books, etc., could be shown, too, based on the same flowers and vegetables.